

ALGEBRAIC LOW-DENSITY PARITY CHECK CODE DESIGN
FOR VARIABLE BLOCK SIZES AND CODE RATES

ABSTRACT

A higher code rate Low-Density Parity Check (LDPC) matrix may be designed by concatenating additional matrices to a π -rotation parity check matrix. The concatenated matrix may be selected such that the resultant LDPC matrix exhibits good expansion characteristics to enable the LDPC matrix to be used with variable block length codes. The codes may be designed by generating an ensemble of available codes, encoding them with information vectors of weight 1 and 2 and discarding codes with a low minimum distance. The approximate upper bounds for the remaining codes are then calculated and a small set of codes with the lowest bound under high signal to noise ratio is selected. The girth distributions for the remaining codes are then calculated and the code that has the minimum number of short cycles is selected. The selected code is concatenated to the original π -rotation parity check matrix.